

Beta Testing the RIF for Selected Birth Defects in Florida

“An Update for Panel Discussion”

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- Issues surrounding Birth Defects
 - Relatively rare
 - “Time Window” of exposure
 - Risk Factors: Multifactor association, Genetic, Environmental, .,
 - Dose: prolonged low levels, high?
 - Others, i.e., Parental Occupation
 - Maternal Residence and Proximity to NPL sites

Maternal Residence near Hazardous Waste Sites or Landfills and Birth Defect Studies

- Geschwind, SA, Stolwijk JA, Bracken M., et al., (1992). Risk of Congenital malformations associated with proximity to hazardous waste sites, *Am J Epidemiol.* 135: 1197-207.
- Shaw GM, Schulman J, Frisch JD, Harris JA (1992). Congenital Malformations and birthweight in areas with potential environmental contamination. *Arch Environ Health.* 1992; 47; 147-54.
- Croen LA, Shaw GM, Sanbonmatsu L., Selvin S, Buffler PA (1997). Maternal residential proximity to hazardous waste sites and risk for selected congenital malformations. *Epidemiology.* 8:347-54.
- Dolk H, Vrijheid M., Armstrong B., et al., (1998). Risk of Congenital anomalies near hazardous-waste landfill sites in Europe: the EUROHAZCON study. *Lancet.* 353:423-7.
- Elliott P., Briggs D, Morris S, et al. (2001). Elliot P., Briggs D., Morris S., et al., Risk of Adverse birth outcomes in populations living near landfill sites. *BMJ.* 323: 363-8.
- Brender, J, Zhan, B., Suarez, L., Langlois, P., et al., (2006) Linking Environmental Hazards and Birth Defects Data. *International Journal of Environ Health.* 12:126-133.

Selected Congenital Heart Malformations

- Common Truncus
 - Transposition of great arteries
 - Tetralogy of Fallot
 - Endocardial cushion defect
 - Aortic valve stenosis
 - Hypoplastic left heart syndrome
 - Coarctation of the aorta
- ICD-9-CM Codes
 - 745.0
 - 745.10-745.12, 745.19
 - 745.2
 - 745.60, 745.61, 745.69
 - 746.3
 - 746.7
 - 747.10

Data

Health Data: Congenital heart malformations (Florida BDR)

Advantage: Baseline rates have been established, allows us to compare an observed rate with what is expected

Population Data: Live Births (Vital Statistics)

Environmental Data: Identified SuperFund (NPL) sites
Released the chemical TCE (or other organic solvents).

Geographic Data: Long. and Lat. Coord. centroids

SES Data: Identified Poverty (and Maternal Education) as Covariates
(US Census)

Results are still crude and are not necessarily valid

Crude comparison analysis

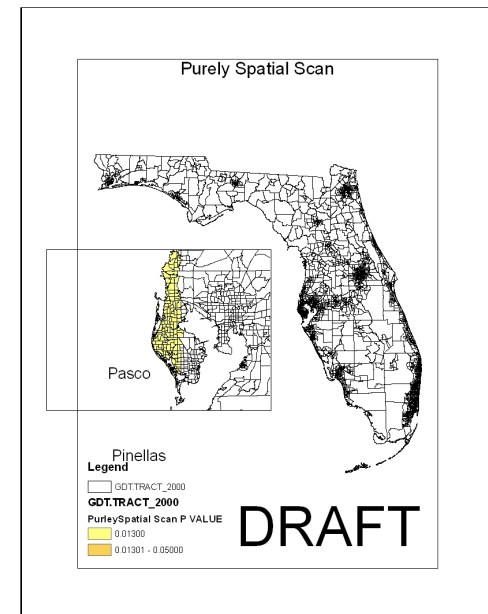
- SaTScan: A spatial scan statistic used for disease cluster detection.
- Birth Defects Clustered by Space (purely spatial analysis clustering, no temporal component) – Identified Pinellas Co.
- RIF - used the Disease Mapping function to perform (aggregated) census tract level analysis.
- A Crude Comparison of SaTScan results and RIF results
- Used the RIF Risk Analysis function to verify rates around a NPL site.

SaTScan – Pinellas Co.

SaTScan Disease Clustering at 10 km Purely Spatial Analysis

Table 1.

Time Period	Observed	Expected	SIR	P-value
1997-2002	102	61.77	1.6	0.013

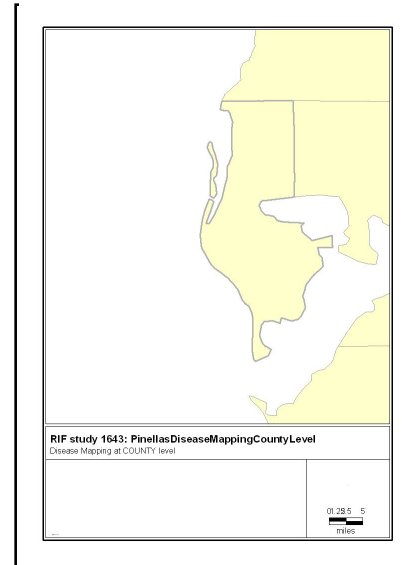


RIF – Pinellas Co.

RIF Disease Mapping – Census Tract Analysis

Table 2.

Time Period	Observed	Expected	RR	LCL	UCL
1998-2000	111	69.55	1.6	1.33	1.92



Crude Comparison Results

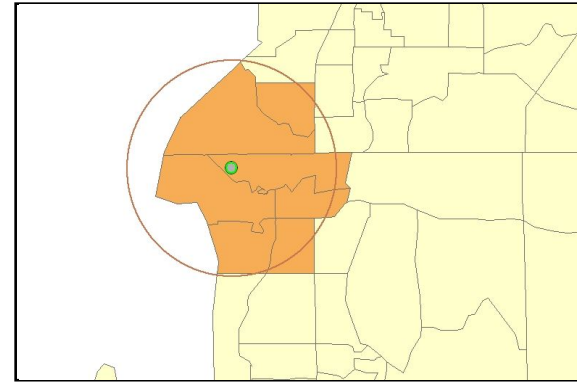
SaTScan Disease Clustering Purely Spatial Analysis

Time Period	Observed	Expected	SIR	P-value
1997-2002	102	61.77	1.6	0.013

RIF Disease Mapping Analysis

Time Period	Observed	Expected	RR	LCL	UCL
1998-2000	111	69.55	1.6	1.33	1.92

RIF – Risk Analysis



RIF Risk Analysis – 5 km

Table 3.

Time Period	Observed	Expected	RR	LCL	UCL
1998-2000	11	8.03	1.37	0.68	2.45

What did we Accomplish with the RIF ?

- We developed record linkages between children born with congenital heart malformations and maternal residential proximity to NPL sites.
- We were able to broadly and crudely identify clusters of CHD (with the option of adding a temporal component to the analysis)
- We are able to “rapidly” identify rates around point sources of contamination
- We identified SaTScan as a useful tool for disease cluster detection (and have worked towards coordinating the developer and the IC to incorporate the tool into RIF).
- We are able to identify areas of SES (Poverty and Maternal Education) levels surrounding NPL sites.
- We are able to display the results and smoothed rates in GIS using Bayesian statistics.

Beta Testing Comments

(Birth Defects) Things to consider

- Incorporate - Covariates contained within the Birth Certificate Record such as Tobacco, Alcohol use, Prenatal visits, etc.,
- Use maternal age categories <20, 20-24, 25-29, 30-30, 35+ for analysis
- Geocoding Accuracy of NPL sites and maternal address
- Use Population weighted Centroids as opposed to Geographic weighted Centroids
- When considering rare events, i.e., birth defects, in sparsely populated areas, - may have to aggregate to gain more stable disease rates.

Summary

- As an EPHT tool, found it simple to use – useful tracking tool, provides visual display
- Incorporates GIS, Winbugs, all in one package.
- We'd like to see the following:
 - SaTScan incorporated
 - A “fake” data set included into the updated manual for the user
 - CDC Web board updated with questions and answers comments (user group)